Whole-Structure Decontamination of *Bacillus* Spores by Methyl Bromide Fumigation

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For more than five decades, millions of structures in the United States have been fumigated for the control of arthropod and vertebrate pests. Procedures used in structural fumigation include sealing the entire building under tarpaulins or by other means. Once the building is deemed gas-tight, a fumigant is introduced within the seal so that the fumigant, as a true gas, impinges upon all components within the building. After a specified concentration, temperature, and exposure time is achieved for a given target pest, the seal is broken and the structure is aerated of the fumigant. Oliver Exterminating Corporation proposes to use structural fumigation techniques to decontaminate a given structure of a microbial contaminant, such as *Bacillus anthracis* spores, with methyl bromide (MB) as the fumigant.

Laboratory studies will be used to identify the concentration, exposure time, and temperature parameters needed for MB to kill spores of *B. stearothermophilus* and *B. subtilis*, which are considered to be surrogate spores for *B. anthracis* in recent U.S. Environmental Protection Agency decontamination studies. Spores loaded on standard sterilization test strips at concentrations of 10^5 to 10^8 will be exposed at constant temperature and concentration in 9-liter glass fumigation chambers. After each serial exposure trial, strips will be incubated in tryptic broth to assess for either complete sterilization (no vegetative growth) or for an unquantified level of failure (vegetative growth) to kill all spores. Results will guide future parameter selections. Once parameters are identified as practical for field replication, a 10,000 ft^3 mobile home will be fumigated with MB after installing spore strips placed in challenging locations that require MB diffusion to achieve activity at these target sites. Common office supplies and equipment also will be placed in the mobile home to assess electrical malfunction or visual damage. Results will indicate whether MB can kill *Bacillus* spores using current whole-structure fumigation technology for rapid field decontamination without collateral damage.

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